Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of:	)	
	)	IB Docket No. 02-10
Procedures to Govern the Use of Satellite Earth Stations on Board Vessels in the 5925-6425 MHz/3700-4200 MHz Bands and 14.0-14.5 GHz/11.7-12.2 GHz Bands	)	

To: The Commission

REPLY COMMENTS OF STRATOS OFFSHORE SERVICES COMPANY

Stratos Offshore Services Company ("Stratos"), by its attorneys, hereby files these reply comments in the above-captioned proceeding.[1] As discussed in its initial comments, Stratos supports the Commission's efforts to adopt rules to permit the operation of earth stations onboard vessels ("ESVs") in C-band and Ku-band Fixed-Satellite Service ("FSS") spectrum, consistent with the overriding need to protect incumbent terrestrial services from harmful interference.[2] In these reply comments, Stratos underscores certain issues raised in its comments and addresses additional matters raised by other commenters in this proceeding.

I. THE COMMISSION SHOULD PERMIT ESV OPERATIONS IN BOTH C-BAND AND KU-BAND FREQUENCIES

In the *NPRM*, the Commission proposes to allow ESV operations in both C-band and Ku-band frequencies subject to regulatory requirements that account for the unique spectrum sharing

[1] *See* Procedures to Govern the Use of Satellite Earth Stations on Board Vessels in the 5925-6425 MHz/3700-4200 MHz Bands and 14.0-14.5 GHz/11.7-12.2 GHz Bands, *Notice of Proposed Rulemaking*, IB Docket No. 02-10, FCC 03-286 (rel. Nov. 24, 2003) ("*NPRM*").

[2] *See generally* Comments Of Stratos Offshore Services Company, IB Docket No. 02-10 (filed February 23, 2003) ("Stratos Comments").

conditions in each of those bands.[3] However, because of concerns about ESVs sharing with C-band terrestrial Fixed Service ("FS") operations, certain FS interests suggest that ESVs be prohibited from operating in C-band transmit frequencies (5925-6425 MHz) within 300 km of the U.S. coastline.[4] As a result of similar concerns, the Commission itself questioned whether it would it be possible or appropriate to establish a plan to phase out C-band ESV operations and have ESVs transition to the Ku-band.[5]

Stratos strongly believes that ESV networks can provide significant public benefits by delivering broadband services to vessels at sea and in port, and therefore should be permitted in both C-band and Ku-band FSS frequencies. The C-band and Ku-band each offer unique advantages in the provision of maritime broadband communication services. In addition to its desire to deploy Ku-band ESVs, Stratos has military and commercial customers with a significant need for maritime broadband data services on deep-water maritime routes throughout the world which are best met using C-band spectrum. C-band ESVs benefit from the broad oceanic coverage afforded by C-band satellites, as well as superior link performance in rain-fade conditions associated with lower frequency bands and larger antennas.

The instant rulemaking proceeding is the culmination of a U.S.-led, multi-year effort to establish a normalized regulatory framework for ESV operations. In this connection, the

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[3] *See generally NPRM*.

[4] *See* Comments of the Fixed Wireless Communications Coalition, IB Docket No. 02-10 (filed February 23, 2003) ("FWCC Comments"). The FWCC does not oppose ESV operations in the Ku-band or in the 3700-4200 MHz C-band receive frequencies, so long as ESVs cannot claim protection from 4 GHz FS operations. The Association of Public Safety Communications Officials International, Inc. ("APCO") and King County Information and Telecommunications Services Division ("King County") support FWCC's call for a ban on ESV operations in the C-band. *See* APCO Comments, IB Docket No. 02-10 (filed February 23, 2003); *See* King County Comments, IB Docket No. 02-10 (filed February 23, 2003).

[5] *See NPRM* at ¶63.

International Telecommunication Union ("ITU") has adopted new spectrum allocations to facilitate ESV operations and procedures to coordinate ESV and terrestrial operations so that incumbent terrestrial services are adequately protected. In the *NPRM*, the Commission proposed additional enhanced measures to ensure that future expansion of C-band terrestrial services in the United States is not unduly constrained. ESV proponents, satellite operators and the frequency coordination community all agree that C-band ESVs can be operated in and around the United States consistent with protection of terrestrial FS operations.[6] Accordingly, there is no reason to prohibit ESV use of C-band frequencies within the minimum distance from the U.S. coastline.

Finally, prohibiting the use of C-band ESVs in and around the United States would necessitate the use of Ku-band spectrum to provide service, requiring the installation of complex dual-band equipment and the acquisition of redundant and costly Ku-band satellite capacity. Because foreign ESV operators would not be so constrained and may still provide C-band ESV service on a non-interference basis under Article 4.4 of the international Radio Regulations, U.S.-licensed ESV operators would be placed at an extreme competitive disadvantage vis-à-vis their foreign counterparts. In sum, prohibiting C-band ESV operations within 300 km of the U.S. coastline or otherwise transitioning ESV operations to the Ku-band is unnecessary and would be contrary to the public interest.

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[6] *See* Stratos Comments at 7-16; Comments of Maritime Telecommunication Network, Inc., IB Docket No. 02-10 (filed February 23, 2003) ("MTN Comments") at 7-23; Comments of Inmarsat Ventures LTD, IB Docket No. 02-10 (filed February 23, 2003) ("Inmarsat Comments") at 1-3, 11-13, 17-23; Comments of Telenor Satellite Services, Inc., IB Docket No. 02-10 (filed February 23, 2003) ("Telenor Comments"); Comments of Broadband Maritime, Inc., IB Docket No. 02-10 (filed February 23, 2003); Comments of SES AMERICOM, Inc., IB Docket No. 02-10 (filed February 23, 2003) ("SES AMERICOM Comments"); Comments of Intelsat Global Services Corporation, IB Docket No. 02-10 (filed February 23, 2003) ("Intelsat Comments"); Comments of Pinnacle Telecom Group, IB Docket No. 02-10 (filed February 23, 2003) ("Pinnacle Comments"); Comments of the National Spectrum Managers Association, IB Docket No. 02-10 (filed February 23, 2003) ("NSMA Comments").

II. LICENSING ISSUES FOR C-BAND ESV OPERATIONS

The Commission proposed two licensing approaches for C-band ESVs -- a Non-Coordination Approach and a Coordination Approach -- under which ESVs would be authorized to operate on a non-interference basis vis-à-vis co-primary U.S. terrestrial services. Stratos agrees that C-band ESV operations should be authorized on a non-interference basis only[7] and supports the availability of both licensing approaches. Stratos addresses below certain comments regarding the Commission's proposed C-band ESV licensing approaches.

A. Non-Coordination Approach

The Non-Coordination Approach is essentially operation on a non-harmful interference basis with a two-year license term and a comprehensive set of operational requirements for C-band ESVs.[8] With the exception of Maritime Telecommunications Network, Inc. ("MTN"), the other C-band ESV proponents support licensing pursuant to the Non-Coordination Approach.[9] In contrast, MTN argues that the Commission must reject the Non-Coordination Approach because it does not afford C-band ESV operators sufficient regulatory certainty and inappropriately penalizes them for potential interference despite more than a decade of virtually

[7] Such an approach is consistent with the approach taken by the Commission in other proceedings where unique sharing issues and the public interest warrant permitting operations of a primary service on a non-interference basis vis-à-vis a co-primary service. *E.g.*, *Amendment of Parts 2 and 25 of the Commission's Rules to Permit Operation of NGSO FSS Systems Co-Frequency with GSO and Terrestrial Systems in the Ku-band Frequency Range*, First Report and Order and Further Notice of Proposed Rule Making, 16 FCC Rcd. 4096, 4160-4173 (2000) (authorizing NGSO FSS service on a co-primary, non-interference basis with BSS in the 12.2-12.7 GHz band).

[8] *See NPRM* at ¶¶ 63-68.

[9] *Compare* Stratos Comments at 10-12; Comments of Broadband Maritime, Inc. at 3-5; Inmarsat Comments at 18; Telenor Comments at 2-3; *with* MTN Comments at 13-14.

interference-free operation of ESV operations at C-band. MTN instead urges the Commission to adopt a modified Coordination Approach that sufficiently protects C-band ESV operations.[10]

With the exception MTN's lone objection, the uniform support for the proposed Non-Coordination Approach of all other C-band ESV proponents confirms that this approach is appropriate for C-band ESV licensing. Indeed, it is precisely because ESVs have successfully operated in C-band spectrum on a non-interference basis for years that Stratos and others have argued for the continued availability of this licensing option.

Stratos agrees, however, that the proposed two-year license term under the Non-Coordination Approach does not provide sufficient regulatory certainty for long-term ESV operations.[11] Indeed, the brief two-year license term may have been designed to facilitate transitioning ESVs from C-band to Ku-band, an approach which has been opposed by most commenters in this proceeding. Extending the licensing term under the Non-Coordination Approach would not alter the obligations of ESV operators to protect fully existing and future terrestrial C-band operations, but would significantly reduce the administrative burden on the Commission and ESV operators of continually renewing ESV licenses with two-year terms. Accordingly, Stratos supports extending the license term under the Non-Coordination Approach to ten years,[12] or even to the standard earth station license term of 15 years.

Not surprisingly, the terrestrial FS interests that suggested prohibiting C-band operations entirely also opposed licensing C-band ESV pursuant to the Non-Coordination Approach.[13]

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[10] *See* MTN Comments at 13-16.

[11] *See* Comments of Broadband Maritime, Inc. at 3-4; Comments of Inmarsat at 18-19.

[12] *See* Comments of Broadband Maritime, Inc. at 3-4.

[13] *See* FWCC Comments at 10-11; *see also* APCO Comments and King County Comments.

According to the Fixed Wireless Communications Coalition ("FWCC"), asking terrestrial FS operators to document interference events and work with ESV operators to resolve interference is unreasonable and unduly burdensome.[14] However, the Non-Coordination Approach includes a comprehensive set of operational requirements on C-band ESVs to prevent and address harmful interference that imposes the vast majority of the spectrum sharing burden on ESV operators. Furthermore, *any* spectrum sharing regime involves the possibility of interference and imposes some additional burden for co-frequency operators to work cooperatively to resolve interference issues. Because the superior regulatory status of C-band terrestrial services will ensure absolute protection for existing and future operations, terrestrial FS operators can be justifiably requested to assist in identifying and resolving any harmful interference in the unlikely event that it should occur.

The frequency coordination community also expressed concern with licensing C-band ESVs pursuant to the Non-Coordination Approach.[15] Notwithstanding the vested interest of frequency coordinators in the adoption of a Coordination Approach to ESV licensing, Stratos believes that the concerns of FS operators and the frequency coordination community regarding the potential for harmful interference have been addressed adequately by the Commission under the Non-Coordination Approach. In view of the substantial public benefits to be derived from authorizing C-band ESV operations pursuant to the Non-Coordination Approach, and the relatively successful history of C-band ESV operations on a non-interference basis to date, the Commission should ensure that this licensing option remains available to ESV operators.

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[14] *See* FWCC Comments at 10-11.

[15] *See* Pinnacle Comments at 2; NSMA Comments at 16.

B. Coordination Approach

Under the Coordination Approach, C-band ESV operations would be licensed for a term of 15 years subject to a number of specific operating conditions.[16] Importantly, C-band ESV operators would be able to coordinate only a limited amount of spectrum at each location (36 MHz in each direction of transmission for each of two satellites) and would not receive any protection from future terrestrial operations.[17] Stratos generally supports the Coordination Approach to C-band ESV licensing proposed by the Commission.[18]

The FWCC, however, has proposed a far more onerous set of requirements for C-band ESV licensing under the Coordination Approach. Specifically, the FWCC has proposed that the Commission authorize C-band ESV operations in the 5925-6425 MHz band subject to the following conditions: (i) pre-coordination of all ESV routes within 300 km of the U.S. coastline and suspension of transmissions on uncoordinated route segments; (ii) GPS-based automatic shutdown for ESVs that deviate from coordinated routes or speeds; (iii) real-time access for FS operators to ESV vessel itineraries, frequencies, bandwidths and satellites, and a 24/7 point of contact capable of shutting down ESV operations if necessary; (iv) coordination limited to spectrum actually needed up to 36 megahertz in each direction of transmission for up to two FSS satellites; (v) a two-year license term; and (vi) a minimum vessel size of 5,000 gross tons.[19] Stratos opposes the extremely burdensome restrictions proposed by the FWCC.

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[16] *See NPRM* at ¶¶ 69-73.

[17] *See id.*

[18] *See* Stratos Comments at 12-16.

[19] *See* FWCC Comments at 3, 11-14. APCO and King County generally supported the FWCC proposal. *See* APCO Comments; King County Comments.

As an operator of an extensive C-band terrestrial network in the Gulf of Mexico region that provides critical communications services between inland commercial centers and drilling and production facilities along the coast and at offshore locations, Stratos has a direct and compelling interest in fully protecting its existing and future C-band microwave operations. However, the measures proposed by the FWCC go far beyond what is required to adequately protect terrestrial operations from harmful interference from C-band ESVs.

For example, the requirement to coordinate "ESV routes" and suspend transmissions when deviating from coordinated routes is unclear and overly restrictive. For example, FWCC's proposal would appear to require suspension of transmission based on a route deviation even if the coordination is based on frequency avoidance where a vessel's route is irrelevant. Even in circumstances of co-frequency operation, the proposal does not appear to account for route deviations that actually decrease the potential for interference (*e.g.*, course changes that increase the separation distance between an ESV and terrestrial station). While specific ESV routes may need to be coordinated in the context of certain port approaches and other coastal operations, Stratos does not believe that specific courses must be coordinated as far out as 300 km from the U.S. coastline. Furthermore, rather than suspending transmissions on uncoordinated routes, Stratos believes that U.S.-licensed C-band ESVs should have the option of operating on a non-interference basis. This would prevent terrestrial FS operators from effectively prohibiting C-band ESV operations by refusing to coordinate all or part of essential vessel routes.

GPS-based automatic shut-off mechanisms are also unnecessary for C-band ESV operations. Like other ESV proponents and Pinnacle, a frequency coordinator, Stratos believes

that such mechanisms would unduly increase the cost and complexity of ESV equipment.[20] Instead, appropriate operational conditions and interference resolution mechanisms, including ESV operator responsibility to operate within coordinated parameters and the ability to shut down offending terminals in the event of interference, are sufficient to ensure protection for terrestrial operations under the Coordination Approach.[21]

Although Stratos supports a requirements for ESV operators to maintain a 24/7 point of contact to resolve potential interference, it opposes making real-time vessel tracking and related ESV information available real-time on an open platform.[22] The provision of such information on a platform accessible via the Internet raises serious security concerns, and certain ESV customers may be sensitive to revealing vessel location information for competitive and security reasons or may not want to have their exact positions disclosed under any circumstances (*e.g.*, government vessels). However, such information can be made available on a confidential basis to affected terrestrial operators and the Commission in the context of interference investigation and resolution procedures.

The FWCC's proposal to limit coordination to the amount of spectrum for which ESV operators can demonstrate "actual need" is also unduly restrictive. The FWCC seeks to apply a standard developed for terrestrial point-to-point operations with a fixed channel plan to a satellite service where spectrum assignment flexibility is essential. The FWCC proposal would permit only coordination of the single transponder channels assigned to ESV operating along a given route at the time of the coordination, and subsequent ESVs operating on separate channels -- or

[20] *See* MTN Comments at 22-23; Comments of Schlumberger Omnes, Inc. at 10; Pinnacle Comments at 5.

[21] *See* Pinnacle Comments at 5.

[22] *See* Stratos Comments at 11-12.

any adjustment to previously assigned channels -- would require a separate coordination. Such an approach is overly burdensome and entirely unworkable in the context of blanket-licensed ESVs. Instead, as proposed by the Commission, ESVs should be permitted to coordinate the amount of spectrum associated with full C-band satellite transponders (36 MHz in each direction of transmission) to afford sufficient flexibility to adjust ESV channel assignments, to accommodate multiple ESVs at a coordinated location or along a coordinated route, and to add new ESVs to a network.

As discussed above, a two-year license term is insufficient in the context of licensing under the Non-Coordination Approach, and is even more inappropriate in the context of licensing pursuant o the Coordination Approach. The standard 15-year license is justified given (1) the time and expense required to coordinate operations; (2) that operations would be coordinated; and (3) that the ESV operator must accommodate future FS installations.

Finally, a 5,000 gross ton vessel size limit for C-band ESVs is unwarranted. Such a restriction would severely and unnecessarily preclude the availability of C-band broadband communications services to a substantial number of commercial and government vessels. This and the other onerous restrictions proposed by the FWCC on C-band ESV licensing under the Coordination Approach are plainly designed to eliminate C-band as a viable option for ESV operations, and thus should be rejected.

III. PROTECTION OF C-BAND STATIONS LOCATED IN THE GULF OF MEXICO

Stratos operates a C-band microwave stations on a large number of offshore oil and gas platforms located more than 100 miles from the U.S. coastline. These offshore facilities should be protected from harmful interference from C-band ESV operations.[23] The National Spectrum

[23] *See* Stratos Comments at 3, 15-16.

Managers Association ("NSMA") agrees that the Commission must take offshore microwave facilities into account in calculating the minimum distance and coordination requirements for C-band ESV operations.[24] Specifically, the NSMA "has clear consensus on the position that recognizes the existence of off-shore microwave operations, primarily in the Gulf of Mexico, and that where such operations exist, the 'coordination distance from shore' figure should also be applied from the position(s) of any offshore microwave operation."[25]

Thus, while Stratos believes that a minimum distance of 300 km would adequately protect its offshore facilities, Stratos could accept a minimum distance and associated coordination requirements for a distance as small as 100 km, provided that the Commission includes the locations of Stratos' offshore terrestrial stations in defining the area within which C-band ESV operations must be coordinated. Specifically, in addition to measuring the minimum distance from the U.S. coastline, the Commission should also measure it from the location of each U.S.-licensed offshore terrestrial station (up to a maximum distance of 300 km from the U.S. coastline established by the ITU for C-band ESV operations).

The Commission also should include future offshore C-band microwave stations in establishing the coordination area for C-band ESVs. Such an approach is necessary to account for future offshore C-band microwave facilities licensed to support new or relocated oil platforms, and will ensure that primary U.S.-licensed offshore C-band microwave stations are protected from interference and remain unconstrained by C-band ESVs to the same extent as U.S.-licensed microwave stations located on land.

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[24] *See* NSMA Comments at 11.

[25] *Id.*

IV. THERE IS UNANIMOUS SUPPORT FOR AUTHORIZING KU-BAND ESV OPERATIONS ON A PRIMARY BASIS

In the *NPRM*, the Commission proposed to allow ESVs to operate on a primary basis in the Ku-band.[26] Stratos agrees that Ku-band ESV operations should be authorized as a primary service in Ku-band FSS spectrum, and all other commenters that addressed Ku-band ESV licensing issues concur.[27]

There was also consensus among commenters on a number of Ku-band ESV operational issues. For example, commenters generally opposed imposition of a minimum vessel size requirement[28] and automatic shut-off capabilities[29] for Ku-band ESVs. Commenters also agreed that Ku-band ESVs qualifying for routine licensing should be permitted to obtain "ALSAT" authority to communicate with all U.S.-licensed satellites and foreign-licensed satellites on the Permitted Space Station List.[30]

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[26] *NPRM* at ¶ 30. Specifically, the Commission proposed to add the following non-Federal Government footnote NGyyy to the U.S. Table of Allocations for the 11.7-12.2 GHz and 14.0-14.5 GHz bands: "NGyyy In the bands 11.7-12.2 GHz (space-to-Earth) and 14.0-14.5 GHz (Earth-to-space), earth stations on board vessels (ESVs) may communicate with space stations of the fixed-satellite service on a primary basis. ESV operators shall take all practical steps to comply with ITU Resolution 902 (WRC-03)." *Id.*

[27] *See generally* MTN Comments; Comments of The Boeing Company, IB Docket No. 02-10 (filed February 23, 2003) ("Boeing Comments"); Inmarsat Comments; Telenor Comments; Comments of Schlumberger Omnes, IB Docket No. 02-10 (filed February 23, 2003) ("Schlumberger Comments"); Comments of Tachyon Networks Incorporated, IB Docket No. 02-10 (filed February 23, 2003) ("Tachyon Comments"); FWCC Comments; Intelsat Comments; SES AMERICOM Comments.

[28] *See e.g.*, Stratos Comments at 16-17; Boeing Comments at 27-28; Inmarsat Comments at 15; MTN Comments at 26; Schlumberger Comments at 10; Intelsat Comments at 6-7.

[29] *See, e.g.*, MTN Comments at 22-23; Schlumberger Comments at 10; Inmarsat Comments at 15-16; Pinnacle Comments at 5.

[30] *See* Boeing Comments at 28-29; MTN Comments at 26; Inmarsat Comments at 15; Schlumberger Comments at 10-11; PanAmSat Comments at 3-4.

The comments in the proceeding further revealed agreement that blanket licensing of ESVs is essential to the success of broadband maritime services.[31] As discussed in Stratos' initial comments, however, rather than applying licensing rules developed nearly 20 years ago for VSATs earth stations with substantially different technical characteristics, the Commission should adopt blanket licensing rules that take into account the unique operational circumstances of ESV operations.[32] Accordingly, the Commission should not adopt the ESV blanket licensing rules proposed in the *NPRM*, but rather should adopt service-specific blanket licensing rules based on the off-axis e.i.r.p. approach and other ESV operational requirements set forth in ITU-R Resolution 902.[33]

[31] *See* Stratos Comments at 19-21; Tachyon Comments; Inmarsat Comments at 13-17; MTN Comments 26-30; Boeing Comments at 14-25; Intelsat Comments at 2-3; SES AMERICOM Comments at 6-7; PanAmSat Comments at 3-4.

[32] *See* Stratos Comments at 19-21; *see also* Boeing Comments at 14-25.

[33] *See generally id.*; *see also* Inmarsat Comments at 13-17.

V. CONCLUSION

For the foregoing reasons, Stratos respectfully requests that the Commission promptly adopt ESV licensing rules that are consistent with Stratos' initial comments in this proceeding and these reply comments.

Respectfully submitted,

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